

On the Inherent Nonlinearity of Frequency-Dependent Time Series Relationships

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abstract

On theoretical grounds, a number of important macroeconomic relationships are thought to be different in intensity and/or sign for low frequency (“permanent”) fluctuations than for high frequency (“transitory” or “unanticipated”) fluctuations. Examples include the consumption-income relation, the Fisher effect, and the relationships between macroeconomic policy variables (e.g., government spending and the supply of money) and variables like output and prices.

We provide a fundamental argument showing that such frequency-dependent relationships cannot possibly be linear. What, then, is the significance of the frequency dependencies commonly detected and analyzed using linear techniques, such as Geweke(1982, 1986)? We elucidate via a simple example and suggest a straightforward nonlinear alternative technique.

Geweke, John (1982), “Measurement of Linear Dependence and Feedback Between Multiple Time Series,” *Journal of the American Statistical Association* 77, 304-314.

Geweke, John (1986), “The Superneutrality of Money in the United States: An Interpretation of the Evidence,” *Econometrica* 54, 1-21.